

WHAT IS CLAIMED IS:

1. A method of forming sputtering targets, comprising:

bonding a backing plate to a plurality of targets located in recesses in a top surface of a casement, wherein an exposed surface of said targets is bonded to said backing plate to form bonded targets; and

removing said casement from said bonded targets to retrieve said sputtering targets.
2. The method of claim 1, wherein said bonding is explosive bonding.
3. The method of claim 1, wherein said bonding is diffusion bonding.
4. The method of claim 1, wherein said targets comprise tantalum or an alloy thereof.
5. The method of claim 1, wherein said targets comprise niobium or an alloy thereof.
6. The method of claim 1, wherein said targets comprise cobalt, titanium, copper, aluminum, tantalum, niobium, or alloys thereof.
7. The method of claim 1, wherein said backing plate comprises copper or an alloy thereof.
8. The method of claim 1, wherein said backing plate comprises cobalt, titanium, copper, aluminum, niobium, tantalum, or alloys thereof.
9. The method of claim 1, wherein said recesses comprise at least 2 recesses.
10. The method of claim 1, wherein said recesses comprise at least 4 recesses.
11. The method of claim 1, wherein said recesses comprise at least 2 recesses having the same or different dimensions to receive said targets, and further comprising at least one smaller recess to receive at least one bond quality test sample.

12. The method of claim 1, wherein said casement is a steel casement.
13. The method of claim 1, wherein said exposed surface of at least one of said targets is substantially flush with said top surface of said casement prior to said bonding.
14. The method of claim 1, wherein said exposed surface of at least one of said targets is not substantially flush with said top surface of said casement prior to said bonding.
15. The method of claim 1, wherein at least one of said targets is not attached to said casement in said recess.
16. The method of claim 1, wherein at least one of said targets is tightly fitted into said recess.
17. The method of claim 1, wherein at least one of said targets is fitted into said recess such that a gap exists between said target and said recess.
18. The method of claim 17, wherein said gap is from about 1 to about 10 mm.
19. The method of claim 1, wherein prior to said bonding, a gap exists between said backing plate and said exposed surface of said targets.
20. The method of claim 1, wherein prior to said bonding, said backing plate is substantially flush with said top surface of said casement, and wherein a gap exists between said backing plate and said exposed surface of said targets.
21. The method of claim 1, wherein prior to said bonding, a protective layer is disposed on said top surface of said casement to prevent bonding of said casement to said backing plate.
22. The method of claim 21, wherein said protective layer is a cardboard layer.
23. The method of claim 1, wherein prior to said bonding, a protective layer is disposed in at least one of said recesses to prevent bonding of said casement to at least one of said targets in said at least one recess.

24. The method of claim 1, wherein prior to said bonding, an interlayer is disposed on said top surface of said casement and said exposed surface of at least one of said targets to facilitate said bonding.

25. The method of claim 1, wherein said removing said casement from said bonded targets comprises cutting away at least a portion of said casement surrounding said bonded targets.

26. The method of claim 25, wherein said removing further comprises machining away any remaining portion of the casement from said bonded targets.

27. The method of claim 1, wherein said removing of said casement comprises cutting away portions of said casement surrounding said bonded targets and providing a sufficient dimension around each bonded target to form a flange from said backing plate around said sputtering targets.

28. The method of claim 1, wherein said removing of said casement from said bonded targets involves removing portions of said casement in one or several steps.

29. The method of claim 1, wherein a bond strength between at least one of said targets and said backing plate is from about 10,000 to about 75,000 p.s.i.

30. The method of claim 1, wherein a bond strength between at least one of said targets and said backing plate is from about 29,000 to about 55,000 p.s.i.

31. The method of claim 1, wherein at least one of said targets has an average grain size of less than about 100 microns.

32. The method of claim 1, wherein said backing plate has a hardness that is at least 10% greater in said backing plate after bonding compared to said backing plate prior to bonding to said target.

33. The method of claim 1, wherein said bonded targets are vacuum sealed within said recess.

34. The method of claim 33, further comprising annealing said bonded targets prior to said removing of said casement from said bonded targets.

35. The method of claim 34, wherein said annealing is in an air furnace.

36. The method of claim 34, wherein said annealing occurs at a temperature of less than about 800° C.

37. A method of forming a sputtering target, comprising:

bonding a backing plate to a target located in a recess in a top surface of a casement, wherein an exposed surface of said target is bonded to said backing plate to form a bonded target that is vacuum sealed within said recess;

annealing said bonded target to form an annealed bonded target; and

removing at least a portion of said casement from said annealed bonded target to retrieve said sputtering target.

38. The method of claim 37, wherein said bonding is explosive bonding.

39. The method of claim 37, wherein said bonding is diffusion bonding.

40. The method of claim 37, wherein said target comprises tantalum or an alloy thereof.

41. The method of claim 37, wherein said target comprises niobium or an alloy thereof.

42. The method of claim 37, wherein said target comprises cobalt, titanium, copper, aluminum, tantalum, niobium, or alloys thereof.

43. The method of claim 37, wherein said backing plate comprises copper or an alloy thereof.

44. The method of claim 37, wherein said backing plate comprises cobalt, titanium, copper, aluminum, niobium, tantalum, or alloys thereof.

45. The method of claim 37, wherein said casement is a steel casement.

46. The method of claim 37, wherein said exposed surface of said target is substantially flush with said top surface of said casement prior to said bonding.

47. The method of claim 37, wherein said exposed surface of said target is not substantially flush with said top surface of said casement prior to said bonding.

48. The method of claim 37, wherein said target is not attached to said casement in said recess.

49. The method of claim 37, wherein said target is tightly fitted into said recess.

50. The method of claim 37, wherein said target is fitted into said recess such that a gap exists between said target and said recess.

51. The method of claim 50, wherein said gap is from about 1 to about 10 mm.

52. The method of claim 37, wherein prior to said bonding, a gap exists between said backing plate and said exposed surface of said target.

53. The method of claim 37, wherein prior to said bonding, said backing plate is substantially flush with said top surface of said casement, and wherein a gap exists between said backing plate and said exposed surface of said target.

54. The method of claim 37, wherein prior to said bonding, a protective layer is disposed on said top surface of said casement to prevent bonding of said casement to said backing plate.

55. The method of claim 54, wherein said protective layer is a cardboard layer.

56. The method of claim 37, wherein prior to said bonding, a protective layer is disposed in said recess to prevent bonding of said casement to said target in said recess.

57. The method of claim 37, wherein prior to said bonding, an interlayer is disposed on said top surface of said casement and said exposed surface of said target to facilitate said bonding.

58. The method of claim 37, wherein said removing said casement from said bonded target comprises cutting away at least a portion of said casement surrounding said bonded target.

59. The method of claim 58, wherein said removing further comprises machining away any remaining portion of the casement from said bonded target.

60. The method of claim 37, wherein said removing of said casement comprises cutting away portions of said casement surrounding said bonded target and providing a sufficient dimension around said bonded target to form a flange from said backing plate around said sputtering target.

61. The method of claim 37, wherein said removing of said casement from said bonded target involves removing portions of said casement in one or several steps.

62. The method of claim 37, wherein a bond strength between said target and said backing plate is from about 10,000 to about 75,000 p.s.i.

63. The method of claim 37, wherein a bond strength between said target and said backing plate is from about 29,000 to about 55,000 p.s.i.

64. The method of claim 37, wherein said target has an average grain size of less than about 100 microns.

65. The method of claim 37, wherein said backing plate has a hardness that is at least 10% greater in said backing plate after bonding compared to said backing plate prior to bonding to said target.

66. The method of claim 37, wherein said annealing is in an air furnace.

67. The method of claim 37, wherein said annealing occurs at a temperature of less than about 800° C.

68. A sputtering target formed by the method of claim 1.

69. A sputtering target formed by the method of claim 37.

70. A method of forming a bonded metal article, comprising:

bonding a backing plate to a metal article located in a recess in a top surface of a casement, wherein an exposed surface of said metal article is bonded to said backing plate to form a bonded metal article that is vacuum sealed within said recess;

annealing said bonded metal article to form an annealed bonded article; and

removing at least a portion of said casement from said annealed bonded article to retrieve said bonded metal article.

71. The method of claim 70, wherein said annealing is in an air furnace.

72. The method of claim 70, wherein said annealing occurs at a temperature of less than about 800° C.